DISSERTATION ON
STUDY OF SALIVARY GLAND TUMOURS

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CERTIFICATE

This is to certify that **"DISSERTATION ON STUDY OF SALIVARY GLAND TUMOURS"** is a bonafide work done by **Dr. S. MAHESH KUMAR,** post graduate in department of **General Surgery, Stanley Medical College, Chennai- 1** under my guidance and supervision in fulfillment of regulation of **The Tamilnadu Dr. M.G.R.Medical University** for award of **M.S. Degree Branch I, Part II (General Surgery)** during academic period from **March 2006** to **March 2009**.

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DECLARATION

I, **Dr. S. MAHESH KUMAR**, Solemnly declare that this dissertation **"STUDY OF SALIVARY GLAND TUMOURS"** is a bonafide record of work done by me in the Department of General Surgery, Government Stanley Medical College and Hospital, Chennai under the guidance of **Prof. Dr. S. DEIVANAYAGAM, M.S.** Department of General Surgery, Government Stanley Medical College and Hospital, Chennai – 600 001.

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CONTENTS

STUDY OF SALIVARY GLAND TUMOURS

INTRODUCTION

The salivary gland tumours form 6% of tumours of head and neck. Cancer arising in the salivary glands remains a challenging problem for the head the neck surgeon. The relative rarity of these cancer makes it difficult to study their biologic activity and response to therapy. The intricate anatomy of the facial nerve and the submandibular triangle present technical challenges in surgical dissection. The goal of surgery for salivary gland cancer is en-bloc resection of the cancer with clear surgical margins and minimal morbidity. (Ries *et al.,* 1991).

In the historical survey, little was written about the salivary glands up to the middle of the 17th century. In 1660, Neil Stenson discovered the parotid duct in sheep's head and named it after him. Thomas Wharton in 1656 identified the submadibular duct and gland and Bartholinus in 1669, the sublingual gland.

Early operations on the parotid gland were reported by Siebold in 1781. Samuel white of Hudson, New York is credited with the fist successful surgical removal of the parotid in 1808.

The first attempt at Total Parotidectomy with preservation of the nerve was made by Codreanu in 1892. Blair in 1912, Sistrunk in 1921 and Bailey in 1941 demonstrated various methods to protect the nerve.

The first clinical description of a parotid tumour was by Kaltschmeid in 1772. A classification of salivary gland tumour based on gross morphology was advanced by Auguste Bernard in 1841. Further contribution to literature came from Virchow in 1863, Minsen in 1874, Adson in 1923, Warthin in 1929, James in 1934, Radon in 1934 and Billroth 1959. Modern trends in conservative surgery was described by David Patey in 1965.

AIM OF THE STUDY

1. To study the age, sex incidence of salivary gland tumours.

2. To study the incidence of benign and malignant tumours in parotid, submandibular, sublingual and in minor salivary glands.

3. To study the role of Fine Needle Aspiration Cytology (FNAC) in the diagnosis of salivary gland tumours.

4. To study the various modalities of treatment undertaken of salivary gland tumours and to study the operative morbidity and mortality for various procedures.

SURGICAL ASPECTS OF SALIVARY GLANDS

INTRODUCTION

There are three pairs of major salivary glands (Parotid, Submandibular and Sublingual) in addition to the numerous minor salivary glands in the tongue, palate, cheeks and lips.

EMBRYOLOGY

Embryologically, the major gland and some of the minor glands, arise from the stomadeal ectoderm and most of the minor glands are derived from the pharyngeal endoderm.

PAROTID GLAND

The parotid gland is the largest of the salivary glands being purely serous in nature. It is a compound Alveloar gland situated below the external acoustic meatus between the ramus of the mandible and the sternomastoid. The anterior extension of the gland over the masseter is often detached and is known as the Accessory parotid which lies between the zygomatic arch and the parotid duct.

The gland resembles an inverted three sided pyramid. The investing layer of deep cervical fascia splits between the angle of the mandible and mastoid process to enclose the parotid gland. It has superficial and deep lamina. A portion of the deep lamina extending between the styloid process and mandible, is thickened to form the stylomandibular ligament which separates the parotid fascia in this and incomplete, so there is extension of the parotid gland into paraphryngeal space, which may manifest as dumbbell tumour of the deep lobe of the parotid.

Parotid has an apex, four surfaces (superior, superficial, anteromedial, and posteromedial) and three borders (anterior, posterior and medial).

The apex overlaps the posterior belly of digastric through which the cervical branch of facial nerve and the two division of the retromandibular vein emerge.

Superior surface (or) base of the pyramid is related to superficial temporal vessels and auriculo temporal nerve. Superfical surface is covered with superficial fascia, which contains anterior branches of the greater auricular nerve.

The anteromedial surface is related to the masseter & branches of facial nerve. The posteromedial surface is related to mastoid process, styloid process, external and internal carotid arteries.

RELATIONSHIP OF FACIAL NERVE TO PAROTID GLAND

According to Bailey's bilobar theory, the parotid gland is a bilobed structure with a larger superficial lobe and a smaller deep lobe connected by an isthmus with the facial nerve lying in a connective tissue plane separating the two lobes.

David Pateys Facio-venous plane concept states that, the gland is separated into superficial and deep by the posterior

facial vein and the facial nerve. But, Meckenzie demonstrated that even when a facial plane seemed to bisect the gland into two lobes, the nerve usually does not pass through the plane but seemed to penetrate the substance of one or other lobe.

Winsten and Ward confirmed the unilobar structure and believed that rather than a “parotid sandwich” the nerve could be compared to the “Creeper Vine weaving into the meshes of a trellis work” parotid gland.

The facial nerve after leaving the skull by passing out through the stylomastoid foramen, at a point 2.5 to 4 cm deep to the middle of the anterior border of mastoid process, the nerve passess into the gland.

It passes around the neck of the condyle of the mandible and rapidly becomes superficial and divides into a upper temporofacial division and a lower cervicofacial divisions and subsequently into a number of branches, some of which may be interconnected (pes-anserinus – like the foot of a goose). The branches of facial nerve are temporal, zygomatic, buccal, mandibular and cervical. Before entering the gland it gives of the

posterior auricular nerve and nerves to the stylohyoid muscle and posterior belly of digastric.

STRUCTURES WITHIN THE PAROTID GLAND

FROM MEDIAL TO LATERAL

1. External Carotid Artery : In enters and gland through its posteromedial surface and divides into maxillary artery and superficial temporal artery. The maxillary artery leaves the gland through its anteromedial surface. Superfical temporal vessels emerge at the anterior part of superior surface. Posterior auricular artery may arise within the gland.

2. Retromandibular Vein : It is formed within the gland by the union of superficial temporal vein and maxillary vein. In the lower part of the gland the vein divides into anterior and posterior divisions which emerge at the apex (lower pole of the gland.

3. Parotid duct (Stenson's duct) : It is 5cm long which begins deep to and behind the angle of the mandible. It curves upwards and forwards through and gland receiving interlobular ducts as it goes. It passes forwards across the masseter and

turns around its anterior border to pierce the buccinator and to open into the mouth via a small papilla on the inside of the cheek, opposite the second upper molar tooth.

SUBMANDIBULAR GLAND

The submandibular gland fills the major portion of the digastric or submandibular triangle enclosed in a loose sheath of deep cervical facia.

The gland rests against the structures forming floor of the triangle, the mylohyoid and hyoglossus muscles. The gland has two portions, a superficial lobe lying superficial to the mylohyoid and a deep lobe wrapping around the posterior border of the mylohyoid muscle.

Between the gland and the hyoglossus are the lingual nerve, the submandibular ganglion and the hypoglossal nerve. The submandibular duct (Wharton's duct) is about 5cms long, runs forward from the deep part of the gland to enter the floor of the mouth on a papilla, beside the frenulum of the tongue.

The facial artery ascends in a deep groove on the posterior end of the gland and then turns downwards and laterally between the gland and the mandible to enter the face at the anterior border of masseter. The gland is a seromucinous gland.

The venous drainage is both into the anterior facial vein and the venae commitantes of the lingual artery.

SUBLINGUAL GLAND

It lies superficially in the floor of the mouth covered only by the oral mucosa. The gland does not have a single large excretory duct, but has a series of ductules that open either into the floor of the mouth directly or into the submandibular duct. The submandibular duct thus serves both the glands.

MINOR SALIVARY GLANDS

Embryologically they are derived from the pharyngeal endoderm.

Physiologically, they produce serous fluids which wash away the sapient materials from the taste buds, maintaining the receptivity for fresh gustatory stimuli.

The minor salivary glands consist of small accumulation of glandular tissue situated mainly beneath the oral mucosa. They empty their secretions into the oropharynx by way of rudimentary ducts. Such salivary acini are scattered throughout the lining of the lips, buccal cavity, platate, nasopharynx, nose and paranasal sinuses. Batsakis recorded such salivary tissue in the body of the mandible, lower part of the neck, hypopharynx, middle ear, sternoclavicular joint and thyroglossal duct.

They are most abundant in the hard palate. The minor salivary glands and the sublingual glands have short straight duct system and are seldom affected by inflammatory condition, but react to anything causing obstruction to the flow. If partial it leads to mucocele, if complete leads to atrophy of the gland.

PHYSIOLOGY OF SALIVARY GLANDS

SALIVARY FUNCTION AND REGULATORY MOLECULES

Salivary Gland	Regulator	Second Messenger	Effect
Parotid Gland	Acetylcholine α - adrenergic substances P β adrenergic VIP	Ca++ AMP	Production of Saliva, Enzyme Secretion, increases cell metabolism Secretion of enzymes, increases cell metabolism.
Submandibular Gland	ACH α - Adrenergic β adrenergic VIP	Ca++ ? c.AMP ? c.AMP	Production of Saliva Production of Mucin Potentiates Ach effects, Enhances blood flow

Willams *et al.,* 1984

PATHOLOGY

Salivary gland tumours are classified into different categories based on their histologic appearance. There are about six classifications.

1. Foote and Frazel (1934)
2. Patey's (1965)
3. Eneroth 1967
4. WHO classification – Thackray 1972.
5. Batsakis 1979
6. Schwartz

Baksakis and co-workers have described a classification system based on histo morophological criteria. Within this system the potential confusion and controversy regarding acinic cell and mucoepidermoid lesion is avoided by not considering them as tumours but rather as carcinoma.

1. WHO CLASSIFICATION

I. Epithelial Tumours

A. Adenomas

1. Pleomorphic adenoma (Mixed tumours)
2. Monomorphic Adenomas
    a. Adenolymphoma
    b. Oxyphilic adenoma
    c. Other types

B. Mucoepidermoid tumours

C. Acinic cell tumours

D. Carcinoma

1. Adenoid cystic carcinoma
2. Adenocarcinoma
3. Epidermoid carcinoma
4. Undifferentiated carcinoma
5. Carcinoma in Pleomorphic adenoma

II. Nonepithelial Tumour

1. Hemangioma
2. Lymphangioma
3. Neurofibroma

BATSAKIS CLASSIFICATION 1979

BENIGN LESIONS

A. Mixed tumour (pleomorphic adenoma)

B. Adenolymphoma (Warthin's tumour)

C. Oncocytosis Oncocytoma

D. Monomorphic adenomas

1. Basal cell adenoma
2. Glycogen-rich adenoma and clear cell adenoma
3. Others

E. Sebaceous adenoma

F. Sebaceous lymphadenoma

G. Papillary ductal adenoma

H. Benign lymphoepithelial lesion

II. MALIGNANT LESIONS

A. Carcinoma arising in or from a mixed tumour

B. Mucoepidermoid carcinomas

C. Hybrid basal cells adenoma / adenoid cystic carcinoma

D. Adenoid cystic carcinoma

E. Acinic cell Carcinoma

F. Adenocarcinomas

G. Oncocytic carcinoma (malignant carcinoma)

H. Clear cell carcinoma

I. Epithelial or myoepithelial carcinoma of intercalated ducts.

J. Squamous cell carcinoma

K. Undifferentiated carcinoma

L. Miscellaneous (including sebaceous carcinoma, Stensen's duct carcinoma, melanomas, and carcinoma ex lymphoepithelial lesions)

M. Metastatic carcinomas

HISTOGENESIS OF TUMOURS

1. Multicellular Theory of Origin – Various cells in the functional salivary complex may give rise to different type of epithelial tumours.

1.	Acinar cells	-	Acinic cell carcinoma
2.	Striated duct cell	-	Oncocytic tumours.
3.	Intercalated duct cells	-	Mixed tumours
			Adenoid cystic carcinomas.
4.	Excretory duct elements	-	Mucoepidermoid tumour,
			squamous cell carcinomas.

II. Another theory of tumour histogenesis is called Basal Reserve cell or Progenitor cell theory. The basal cells of the excretory and intercalated ducts function as progenitor or reserve cells for more highly differentiated compoents.

The myoepithelial cell has been implicated as the element of mixed tumour. This cell by virtue of its interaction with the epithelial component, provides the variable mesenchyme like component of the lesions.

INCIDENCE OF SALIVARY GLAND TUMOUR

Salivary gland tumours comprise 6% of all neoplasms in the head and neck. Minor salivary gland tumours are more in the West Indies. Malignant salivary tumours are prevalent in Eskimos (Wallance *et al.*, 1963). Salivary gland tumour of palate is unduly frequent and malignant in Uganda and appears in young subjects.

Approximately 75% of all salivary neoplasms arise in the parotid gland of which 80% are benign and 80% of the benign tumour are pleomorphic adenomas.

Approximately 15% of salivary neoplasm arise in the submandibular salivary gland, of which 60% are benign and 95% of the benign tumours are pleomorphic adenomas.

10% of salivary neoplasms arise from minor salivary glands, of which only 40% are benign and all the benign tumours are pleomorphic adenomas.

BENIGN LESIONS

PLEOMORPHIC ADENOMA (BENIGN MIXED TUMOUR)

It is the most common of all salivary gland tumour. The term benign mixed tumour was first proposed by Minsen in 1874, to describe the two components of the tumour, mesenchymal and epithelial. The tumours are essentially benign but may recur locally if removal is incomplete and a small proportion less than 5% undergo malignant change sometimes after a very long intervan.

Patey, *et al.,* 1965.

These tumours occur most commonly in young adults, the majority developing before the age of 40. Males and females are equally affected. The parotid gland is the commonest site of the tumour, and nearly 90% of all salivary plemorphic adenomas occur in parotid gland.

Macroscopically the tumours is firm and lobulated with a well defined capsule surrounding it. Microscopically epthielial cells proliferate in strands and some take on a duct like arrangement other cells, probably of myoepithelial origin, proliferate in sheets. In parts of the tumour, a mucoid material

is produced, producing a myxomatous appearance and then an appearance resembling cartilage in histological sections.

The plemorphic adenoma is classified as benign but strands of tumour cells tend to penetrate the capsule of compressed gland substance and connective tissue which surrounds it. Further lobules of tumour attached only by a narrow neck of tissue may extend beyond the limits of the mass. For these reasons simple enucleation will leave residual neoplasm behind and result in potentially disastrous multicentric recurrence, as will rupture of the tumour during its removal. Less than 5% of cases undergo malignant changes, when is described as a carcinoma arising in pleomorphic adenoma.

ADENOLYMPHOMA OR WARTHIN'S TUMOUR (PAPILLARY CYSTADENOMA LYMPHOMATOSUM)

Warthin's Tumour comprises 6 – 10% of all parotid tumours being the second most common benign tumour of the

parotid gland. It is almost exclusively confined to the parotid gland. Very rarely it occurs in submandibular gland. It occurs between 4th and 7th decade with male predominance. Malignant transformation is rare.

Lewis *et al.,* 1999.

It is well encapsulated. The epithelium is double layered and is markedly eosinophilic and the inner cells are columnar, Microscopically, multiple papillae filled with a lymphoid stroma are seen to be projecting into the cystic spaces. The lymphoid tissue found within this tumour resembles that of a lymph node.

The origin of this tumour is controversial. Two theories are put forward to explain the origin of the tumour. (1). Development entrapment theory, where salivary inclusion in the lymph node becomes the tumour (2). Theory of Allerga which offers the possibility that the lymphocytic components represents an immune or hypersensitivity reaction towards epithelial portion of the tumour. Macroscopially, it is well encapsulated, partly cystic often exclude an opaque fluid not unlike pus.

3. ONCOCYTOMA

It forms 1% of tumour, occurring only in parotid gland. It is seen in the older age group. Macroscopically it reveals a smooth, firm, rubbery mass within the parotid tissue. Microscopically it contains round, plumps, granular eosinophilic cells with small indented nuclei. (Oncocytes).

4. MONOMORPHIC ADENOMA

Included in this group are the basal cell adenoma, clear cell adenoma and glycogen rich adenoma. It commonly occurs in minor salivary glands of the upper lip. Also, parotid gland is mostly involved. Rows of peripheral palisading cells with a thick basement membrance is the distinctive feature of this tumour.

MALIGNANT NEOPLASMS

1. MUCO-EPIDERMOID CARCINOMA

It is the most common malignant tumour of the parotid gland. The tumour is slow growing and rarely metastasise to lymph nodes, lungs and skin. Some grow rapidly and are aggressive. It is harder than pleomorphic adenoma, but do not cause facial paralysis. It is composed of sheets and masses of

epidermoid cells and clefts and cystic spaces lined by mucus secreting cells. High incidence of recurrence (15-60%) occurs after the surgery.

2. ADENOID CYSTIC CARCINOMA (CYLINDROMA OR BASALIOMA)

It is the most common malignancy in the submandibular gland. Even though there is no capsule, it is a circumscribed tumour. It also occurs in non-salivary glands like breast, lacrimal glands. 70% of cases arise in minor salivary glands (Spiro *et al.,* 1975).

It consists of myoepithelial cells and duct epithelial cells which occurs in two patterns. 1. Cribriform pattern with reticular network of small dark cells and cyst like spaces with mucin. 2. Solid pattern : No cyst like spaces are seen.

It is an aggressive tumour with early invasion of nerve and bone, which explains the difficulty in eradicating this tumour despite the extent of excision.

3. ACINIC CELL CARCINOMA

It forms 1% of all salivary neoplasm and almost all occur in the parotid gland. The are composed of cells resembling those of serous acini. Female predominance and incidence in children are common.

4. ADENOCARCINOMA

Small dark staining cells with relatively low cytoplasm are seen. They are highly aggressive with high local recurrence and distant metastasis. It is most commonly seen in minor salivary glands, followed by the parotid gland.

CLINICAL FEATURES

Salivary gland tumours are generally slow growing. Parotid tumour present as asymptomatic mass either below the ear lobule and behind the ramus of the mandible or the cheek, lying below the zygomatic arch and on the masseter muscle. It may be firm or hard. Warthin's tumour may be cystic, transilluminant. Pain is usually absent. Malignant tumours infiltrate sensory nerves earlier and produce vague pain in the distribution of greater auricular and auriculotemporal nerve distribution.

Malignancy in suspected when there is short history, pain, rapid growth fixity to muscle or skin, nerve involvement, restriction of temporomandibular joint and enlargement of lymph node.

In parotid deep lobe tumour may present intra orally pushing the tonsil medially. Mucosa over the lump will be freely mobile. Facial nerve palsy either total or incomplete will occur in 8-26% of parotid malignancies.

Submandibular gland tumour should be examined bimanually to differentiate if from lymphnode swelling. Minor salivary gland tumour may present as intra oral tumours.

INVESTIGATION

PLAIN X-RAY FILM

It may show bony erosion

SIALOGRAM

Not very useful in diagnosis of tumours. If may show displacement of duct in benign tumours and irregularity in case

of malignant tumours. Displacement of parotid duct in the case of intraglandular lesions will give a “Bell in hand” configuration.

ANGIOGRAPHY

When deep lobe tumours are suspected, it is useful.

RADIOISOTOPE SCAN

Scanning done with Technetium 99M pertechnetate shows, all the tumour to be cold except Warthin’s tumour which is “hot”.

CT SCAN

Provides precise anatomical details showing exact location of a mass in the gland.

MRI

MRI is useful in delineating the relationship between the parotid tumour and the facial nerve.

TREATMENT

All the parotid tumours except Warthin's tumour should be excised with adequate margins of normal salivary tissue. Superficial parotidectomy is the treatment of choice for the benign as well as low grade malignant tumours. Warthin's tumour can be enucleated.

Total excision is the treatment of choice for all the submandibular neoplasms. Minor salivary gland tumour removal may sometimes require resection of adjacent bone.

SURGICAL TECHNIQUE OF SUPERFICIAL PAROTIDECTOMY

The main objective in superficial parotidectomy is preserving the facial N.

IDENTIFICATION OF FACIAL NERVE

Identification of the facial nerve can be done by two ways.

1. By identifying trunk
2. By Identifying peripheral branches.

Identifying the trunk first has more advantages and chances of injuring the nerve is less, as the main trunk of the nerve is constant in position, can be easily identified.

Sistrunk, Bailey and Hobsley identified the peripheral branch first, namely the mandibular branch. This method proved to be difficult, as some of the tumors are tightly wedged between bony walls of parotid compartment and give difficulty in exposing the trunk at the stylomastoid foramen.

Riessner recommended dissection starting at the zygomatic arch for tumours just below the zygomatic arch. He demonstrated that the upper two branches of the nerve were more constant in position the were large in size at the level of zygoma and lay directly on the periosteum. So it was not necessary to go through salivary tissue to expose the nerves.

SUPERFICIAL PAROTIDECTOMY

Under general hypotensive anaesthesia the head of the operating table is elevated to promote venous drainage. A transparent adhesive is prepared.

The incision starts at the top of the helix and dips in to the tragal notch continued inferiorly in front of the ear and turns back gently under the earlobe to 2.5cm above the tip of mastoid process. The incision is extended up to the greter hornu of hyoid. The skin flap is dissected of the parotid upto the masseter anteriorly (care taken to avoid damage to the Facial branches). The greater auricular nerve and the external jugular vein are identified and divided. The posterior belly of diagastric is traced of the retracting sternocleidomastoid up to the mastoid process.

The dissection is carried along the perichondrium of the tragal cartilage which ends in a pointer, which points to the facial nerve 1cm medially and inferiorly. The bridge of parotid tissue over the facial nerve is elevated down to the diagastric musle. Hemostasis is secured using bipolar diathermy. Nerve is followed forwards which divides after 2 cm. The upper division is dissected out first, followed by the lower division.

The parotid gland is dissected from the nerve and turned downwards. After the removal of the superficial lobe facial nerve is seen over the massester and retromandibular portion of the

gland. After perfect hemostasis with bipolar diathermy or with adrenalin soaks, the wound is sutured in two layers with suction drains.

TOTAL PAROTIDECTOMY

It was indicated for deep lobe tumours and in low grade malignancies.

The procedure is same as superficial parotidectomy until the extension between superficial and deep lobes becomes apparent. The attachment can be between the two division or below the lower division of facial nerve. In the first type dissection of superficial lobe from facial nerve should be from below upwards. In the second type only the lower division with its distal branches is dissected. Para pharyngeal space allow easy finger dissection. Retromandibular vein is always ligated.

RADICAL PAROTIDECTOMY

It is indicated in high grade malignancy with facial nerve infiltration especially in adenoid cystic carcinoma. This procedure consist of removal of tumour with facial nerve along with cuff of tissue around the parotid gland. This consist of platysma laterally, masseter muscle medially, posterior belly of digastric and stylohyoid the superiorly deep jugular nodes and associated fat inferiorly and the tip of the mastoid and a portion of the sternomastoid posteriorly.

COMPLICATIONS AND TREATMENT

1. FACIAL NERVE PARALYSIS

Permanent Facial nerve paralysis is seen is 3-5% of cases and transient palsy is seen in 8-65% of cases.

TREATMENT

In case of accidental injury, the nerve is repaired primarily. If the Facial nerve is sacrificed, autogenous nerve grafting is performed using greater auricular nerve.

Glossopharyngeal, accessory spinal and hypoglossal nerves can be used to anastomose with the peripheral facial nerve.

Transfer of masseter for lower part and temporalis muscle for upper part of the face can be trained. Gille's procedure with temporalis muscle to establish motor power for eyelids is also tried.

2. FREY'S SYNDROME (AURICULO TEMPORAL SYNDROME)

In this condition, there is flushing and sweating of the skin innervated by the auriculo temporal nerve, whenever salivation is stimulated. The condition may follow surgery on parotid and temporomandibular joint.

It is thought that following injury to the auriculotemporal nerve, post ganglionic parasympathetic fibres from the otic ganglion become united to sympathetic nerves from the superior cervical ganglion destined to supply these vessels and glands of the skin.

Antiperspirant can be used to treat this condition. When this produces severe inconvenience, infra tympanic section of

Jacobson's nerve (tympanic nerve running from the 9th nerve via superficial petrosal to the otic ganglion) with or without section of chorda tympani has good results.

3. SALIVARY FISTULA

This is an important complication which diminishes and disappears spontaneously after sometime.

SURGICAL MANAGEMENT OF SUBMANDIBULAR TUMOURS

SUBMANDIBULAR GLAND EXCISION

Sub mandibular gland excision should be performed under General anesthesia. The incision about 5cm placed 2 – 3 cm below the inferior border of the mandible, carried down through the platsyma. The capsule of the gland and surrounding soft tissue should be left intact over the gland when excision is carried out for a neoplasm. In this technique, the marginal mandibular nerve is at risk, so the facial vein and artery should be located, as close to the gland as possible immediately and after transaction should be elevated, superiorly to reflect the marginal mandibular nerve from the field. The gland and

surrounding soft tissue should be dissected from the under surface of the mandible.

The inferior border of the gland is then elevated from the digastric muscle. The facial artery, if transected superiorly will again be transected posterolaterally, as one near its origin from the external carotid artery. The gland is reflected laterally to expose the mylohyoid muscle.

As the free edge of the mylohyoid muscle is retracted, the lingual and hypoglassal nerves and Wharton's duct are identified. The lingual nerve is the parasympathetic supply to the gland, with the apex at the mid point of the gland.

The Wharton's duct lies inferior to the lingual nerve and the hypoglossal nerve is more inferior, which is identified by an accompanying vein, the ranine vein. When all the structures are identified, the duct and branch of the lingual nerve to the gland are ligated and transected. The gland and contiguous soft tissue may be dissected free and removed. A rubber drain is inserted deep to the platysma and the wound is closed in layers.

In case of tumours which is locally invasive, the lingual, hypoglassal and marginal mandibular nerve, the floor of the mouth, tongue, mandible and skin may be included in resection.

COMPLICATIONS FOLLOWING SUBMANDIBULAR GLAND EXCISION

1. Seroma

2. Injury to cervical branch of facial nerve : 6-9 months should elase before offering treatment. If residual weakness persist, division of the equivalent branch on the other side will help to equalize the tone. No functional defect results.

3. Injury to lingual and hypoglassal nerves will result in little deformity and there is no specific treatment.

SURGICAL MANAGEMENT OF MINOR SALIVARY GLAND TUMOURS

80 – 90% occur within the buccal cavity the commonest site being hard palate. 60% are cylindromas which are locally invasive and also metastasize late. 40% are mixed tumours. Preliminary biopsy is advised to establish the diagnosis. The treatment of choice is, radical excision including a wide margin of healthy tissue including mucosa and even bone using diathermy for hemostasis.

The expirpation of oral neoplasm must be planned on an individual basis in each instance. Closure in lip, buccal area, floor of mouth and tongue, can generally be effected by primary suture. Defects in the palate, that do not penetrate the full thickness can be left open to granulate and heal by secondary intention. Larger defects require local or transferred mucosal or skin flaps. Through and through palatal losses necessitate use of dental prosthesis. Paranasal salivary tumours are treated by maxillectomy via the usual Weber Ferquson Cheek Flap. When regional lymphnodes are involved the Radical dissection is performed. Post operative irradiation is advocated for all malignant tumours.

ROLE OF NECK DISSECTION IN SALIVARY TUMOURS

There is different of opinion concerning the indication for neck dissection in salivary gland carcinoma. Eneroth and Hamberger advocate elective neck dissection in all cases of salivary gland cancer, except in low grade mucopidermoid carcinoma.

Sinha and co-workers recommended neck dissection only in clinically apparent metastasis.

Maccomb et al., did not recommend elective neck dissection for parotid cancers but advised neck dissection for malignant tumours of submandibular gland since he demonstrated lymphnode metastasis in 43.7% of submandibular tumours and only 23% in parotid tumour.

ROLE OF RADIOTHERAPY

Fletcher and co-workers recommended adjuvant radiation therapy for high grade cancers and those patients with residual cancer to reduce the local failure rate. But there was no survival advantage for these patients.

In adenoid cystic carcinoma where there is perineural spread, local recurrence rate of 24 – 54% following surgery alone, was reduced to 14% when surgery is combined with post operative irradiation (Spiro et al., 1975)

So the indications for Radiotherapy are as following

1. Presence of locally aggressive cancer.
2. Perineural spread of tumours
3. Cervical metastatic disease
4. Positive surgical margins.
5. Cancer close to the facial nerve.
6. High grade or recurrent tumour

Pre operative radiotherapy in doses of 1200 to 3500 rad is very helpful to reduce the tumour size in radiosensitive tumours viz. adenoid cystic tumours and acinic cell tumours.

ROLE OF CHEMOTHERAPY

The salivary glands are moderately sensitive to chemotherapy durgs. Adenocarcinoma like tumours (adenoid cystic, Adenocarcinoma, acinic cell tumours) respond well to adriamycin, cisplatinum and 5FU. The squamous cell carcinoma and mucoepidermoid tumour respond well to methotrexate and cisplatinum. The overall response rate was 42%. There was regression mainly of local regional disease.

PROGNOSIS

Depends upon a number of factors

1. Histological types

Adenoid cystic cancers and malignant mixed tumours have a better prognosis. Squamous cell carcinoma, Adenocarcinoma, mucoepidermoid, undffierentiated carcinoma all have a poor prognosis.

2. Facial nerve involvement

Patients presenting with facial palsy have poor prognosis.

3. Lymph nodal enlargement has poor prognosis

REVIEW OF LITERATURE

Salivary gland tumours are uncommon, and their epidemiology has not been well described. Salivary gland tumours account for only 6% of head and neck cancer and 0.3% of all cancer (Ries et al., 1991).

Mixed pleomorphic adenomas are more common in 3rd or 4th decade and more prevalent in women.

Warthin's tumours has a strong predilection for males with a male : Female ratio 5:1, it usually occurs in patients over 40 yrs of age.

Monomorphic adenomas occurs on an average in patients over the age of 60.

AGE INCIDENCE

Age	Witt 1999	
	No (59)	%

11 – 20	2	3
21 – 30	2	3
31 – 40	10	17
41 – 50	10	17
51 – 60	17	29
61 – 70	13	22
>70	5	8

According to this study, the parotid tumour occur mostly in 3rd-7th decade.

SEX INCIDENCE

Types	**ASTOR 2002 N=51**	
	Male	**Female**
Benign		
Benign Mixed Tumour	2	16
Warthin's tumour	6	2
Monomorphic adenoma	3	-
Inflammatory	1	5
Lipoma	1	-
Sub Total	**13**	**23**
Malignant		
Squamous cell carcinoma	5	1
Adeno Carcinoma	3	2

Lymphoma	1	1
Merkel Cell Carcinoma	1	-
Basaloid Neoplasm	1	-
Sub Total	**11**	**4**
Total	**24**	**27**

According to the study, the benign tumours are more prevalent in females. Warthin's tumour is more common in males. Carcinoma is more common males.

HISTOPATHOLOGICAL FINDINGS OF PAROTID GLAND TUMOUR

Classification	**Hugo 1973 N=914)**		**Witt 1999 N=53**		**Pinkston and Cole 1999 N=212**		**Vargas PA et al 2002 N=88**	
	No	**%**	**No**	**%**	**No**	**%**	**No**	**%**
Pleomorphic adenoma	8	4	17	32	113	53	58	66
Warthin's tumour	18	9	19	36	60	28	13	14
Mucoepidermoid Ca	-	-	1	2	19	9	9	10
Adenoid Cystic Ca	12	6	-	-	1	0.5	-	-

Malignant mixed tumour	18	9	-	-	2	1%	3	3.4
Acinic Cell carcinoma							1	1.1

According to this table benign tumours are more common parotid of which mixed parotid tumour is the commonest. Warthin's tumour occurs in 9% - 36% of all tumours. Of the malignancies mucoepidermoid carcinoma is present in 9-21% of the tumour.

SUBMANDIBULAR GLAND TUMOURS

Type	**Conley et al., 1972 N=115**	**Spiro et al., 1975 N=217**	**Pinkston & Cole 1999 N=36**	**Vargas PA et al 2002 N=30**
Benign	53%	44%	78%	80%
Malignant	47%	56%	22%	20%

This table shows that in all studies, benign tumours are more common in submandibular glands.

INCIDENCE OF SUBMANDIBULAR GLAND MALIGNANCIES

Type	Conley et al., 1972 N=115	Spiro et al., 1975 N=217	Pinkston & Cole 1999 N=36	Vargas PA et al 2002 N=6
Adenoid Cystic Ca	40	31	35	4
Adeno Carcinoma	0	15	12	1
Mucoepidermoid Ca	10	31	19	1

Among the malignancies of the submandibular gland, adenoid cystic carcinoma is more common.

MATERIALS, METHODS AND OBSERVATION

In this study, 34 consecutive patients with parotid and submandibular tumors who underwent surgery between 2006 – 2009 were studied.

Various clinical manifestations of salivary gland tumours were analysed. Age, Sex, duration of illness, involvement of adjacent structure, histopathological nature of the tumour were studied. Based on the histopathological type treatment was planned. Post Operative morbidity and mortality were studied. A proforma was devised and cases were followed.

AGE INCIDENCE

Age	Parotid		Submandibular	
	Total No. cases	%	Total No. cases	%
0 – 20	4	13.7	3	60
21 – 30	7	24	2	40
31 – 40	5	17.2		
41 – 50	6	20.6		
51 – 60	3	10.3		
61 – 70	3	10.3		
>70	1	3		

SEX INCIDENCE

Sex	Parotid		Submandibular	
	Total No. cases	%	Total No. cases	%
Male	16	55.1	3	60
Female	13	44.9	2	40

Thus in our study, parotid tumours are common in 3rd to 5th decade with male predominance. Submandibular tumours are mostly in younger age group, also with male predominance.

CLINICAL MANIFESTATION OF PAROTID TUMOURS

Symptoms	Total No. of Cases	%
Swelling	29	100
Pain	3	10.3

Thus in main presentation is swelling of the glands and pain is present in present in only 3 cases.

Signs	Total No. of Cases	%
Facial nerve involvement	3	10.3
Lymphnode involvement	-	-
Muscle involvement	-	-
Deep lobe involvement	-	-

In the present study out of 29 cases of parotid tumours, facial nerve involvement was present in 3 cases at presentation, of which all the three cases were found malignant. There was no lymph node involvement. There was no deep lobe involvement.

CLINICAL MANIFESTATION OF SUBMANDIBULAR TUMOURS

Symptoms	Total No. of Cases	%
Swelling	5	100
Pain	2	40

In submandibular tumours, all the cases presented with swelling, of which two had vague pain.

HISTOPATHOLOGICAL INVESTIGATION

FINE NEEDLE ASPIRATION CYTOLOGY : In the present study out of 29 parotid tumours, FNAC was done in 15 cases. Out of 5 submandibular lesions FNAC was done in all the 5 cases.

TECHNIQUE

The skin is cleaned with spirit. A 22 G needle attached to a 20ml syringe is used for aspiration. The area to be aspirated is fixing with thumb and index finger of one hand. The needle with syringe is inserted into the mass with a single quick motion without negative pressure in the syringe. Then negative pressure is created by retracting the plunger of the syringe.

The needle is moved back and forth several times into different areas of the mass maintaining the negative pressure throughout. The plunger is released to equalize the pressure, needle is withdrawn and pressure applied over the puncture site. The content of the needle lumen is expelled on a series of

glass slides, smeared, air dried and stained with Hematoxylin and Eosin stain.

FNAC FINDINGS

Total	**Parotid**			
	Benign		**Malignant**	
29 Cases	Total	FNAC +ve	Total	FNAC +ve
	15	12 80%	5	5 100%

FNAC was done only in 20 out of 29 parotid tumours of which 12 were benign, 5 were malignant and 3 were inconclusive.

Submandibular			
Benign		**Malignant**	
Total	FNAC +ve	Total	FNAC +ve
5	5 100%	0	0

In submandibular tumours all the 5 cases underwent FNAC and all found to be benign tumour.

OPERATIVE MANAGEMENT

Procedure	No. of Cases	%
Superfical Parotidectomy	24	88.8
Total Parotidectomy	3	11.1

In the present study Superficial parotidectomy was done in 24 of cases. Total parotidectomy was doen in 3 out of 5 cases. Two patients refused surgery.

POST – OP COMPLICATIONS

After parotid Surgery,

Complication	No. of Cases	%
Facial Nerve Paralysis		
Transient	5	18.5
Permanent	1	3.7%
Salivary Fistula	-	-
Frey's Syndrome	-	-

Following surgery, 5 patients developed transient facial nerve paralysis and one patient developed permanent facial nerve paralysis.

There was no complication following submandibular gland excision.

DISCUSSION

The parotid, submandibular, and sublingual glands constitute the major salivary gland. When functioning properly the glands are rarely noticed but when involved with neoplastic disease, they can be a challenge in diagnosis and treatment.

In this study, the parotid, submandibular tumours were analysed. Age, Sex incidence, histopathologic type and various treatment modalities were analysed in particular reference to FNAC, surgical treatment and post-operative complication mainly of the facial nerve injury.

AGE INCIDENCE

PAROTID

Age	Witt 1999 Study %	Present Study % 2006-09
0 – 20	3	13.7
21 – 30	3	24
31 – 40	17	17
41 – 50	17	20
51 – 60	29	10
61 – 70	22	10
>70	8	3

The neoplasms of the parotid is more common in 3rd -7th decade. In our study also the parotid tumours are more common in 3rd-6th decade.

In the present study, submandibular tumour occur in 2nd and 3rd decade.

Types	Astor 2002		Present Study 2006-09	
	Male %	Female %	Male %	Female %
Benign Mixed tumour	4	31	41	41
Warthin's tumour	12	4	3	-
Carcinoma	21	8	11	3

Previously reported studies show the incidence rate of salivary neoplasms varied considerably by sex. The male : female incidence ratio for benign mixed tumour showed predominance of female patients. In the present study, incidence in both the sexes is equal.

Previous studies showed that the male incidence for Warthin's tumour, was more than double that of female patients. In this present study the Warthin's tumour is reported in only one male patient.

Incidence rate of all malignant tumour was more than 3 times in males to that of female patients. In this present study also we noticed higher incidence of carcinoma in males.

ROLE OF FNAC

Salivary glands form an important area for aspiration because,

1. Glands are eminently accessible

2. Material is obtained easily

3. Complications are nil

4. Incisional biopsy is contraindicated because of risks of fistula.

5. Good diagnostic accuracy can be achieved with experience (90-95%).

The decision regarding surgical therapy of salivary gland tumours depends mainly on the histopathologic identity of the tumours. Either open biopsy or large bore needle biopsy of salivary gland tumour is undesirable because of the risk of secondary tumours into the wound or needle track. Experience has shown however the fine needle (22 Gauge) aspiration cytology does not result is seeding and this has become useful in pre-op diagnosis.

Jayaram and others reported on FNAC cytologic findings of 247 salivary gland lesions. They reported sensitivity and specificity rates of 87.8% and 98% respectively for the detection of malignant tumours.

Pitts and collegues found the diagnostic sensitivity of FNAC was only 58% for cancer of the salivary gland. Heller and other state the sensitivity for the diagnosis of benign salivary gland tumour ranges from 88% to 98% with a specificity of 94%. The sensitivity for the detection of malignant tumours of salivary glands ranges from 58% to 96%, with specificity of 71% to 88% Additionally, FNAB is not very accurate in differentiating among the various types of malignant tumour with a specific accuracy of only 27% to 85%.

Study	Sensitivity	Specificity
Jayaram et al., 1994	87.8%	98%
Heller et al., 1992	88-98%	94%
Present Study	88%	100%

In our study FNAC was conducted in 15 out of 24 benign parotid tumour and was positive in 12 cases (80%) and inconclusive in 3 cases of all the 5 malignancies FNAC was positive in all the 5 cases (100%). In all the 5 submandibular tumours FNAC was conducted and all the 5 reports showed benign tumours MPT (Benign Mixed tumour) (100%)

Classification	Hugo et al.,	Witt 1999	Pinkston and Cole	Vargas PA et al	Present Study

	1973 N=917		N=53		1999 N=212		2002 N=88		2006-09	
	No	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
Pleomorphic Adenoma	8	4	17	32	113	53	58	66	22	75.8
Warthin's Tumour	18	9	19	36	60	28	13	14	1	3.4
Mucoepidermoid Ca	-	-	1	2	19	9	9	10	4	13.7
Adenoid cystic Ca	12	6	-	-	1	0.5	-	-	1	3.4
Malig Mixed tumour	18	9	-	-	2	1%	3	3.4	-	-
Acinic cell carcinoma							1	1.1		

In the present study MPT was diagnosed in 76% of parotid cases. All of them had undergone Superficial Parotidectomy. Follow up showed no incidence of recurrence. The recurrence rate of mixed tumours offered in the literature vary widely. The primary reasons of recurrence is inadequate removal at the onset (i.e enucleation versus removal of a margin of uninvolved gland). The tumours persist or recur, because pseudopod or parts of the tumour are not removed at the operation, due to neglect or fear of damaging the facial nerve. Rupture or seeding or other seasons. Adequate surgical removal i.e., atleast superficial parotidectomy must be performed. For tumours deep to the facial nerve, the procedure of total conservative parotidectomy is performed by removal of the portion of the

gland deep to the nerve, with preservation of the nerve and its branches.

In our study Warthin's tumour is encountered in 1 case, (3%) of tumours, which underwent Superficial Parotidectomy. Previous reports indicate the presence of Warthin's tumour almost exclusively in parotid gland which occurred between 4th and 7th decades. In our study the tumour occurred in the 4th decade.

In the present study, monomorphic adenoma was reported in only one case which underwent superficial Parotidectomy.

In our study malignancy is reported in 5 cases, out of which 3 had undergone Total Parotidectomy and the other 2 cases refused surgery.

Two cases of mucoepidermoid carcinoma with Pre-operative facial nerve involvement underwent Total parotidectomy.

One case diagnosed as adenoid cystic carcinoma with facial nerve palsy underwent Total Parotidectomy. In the previous study also, due to its strong tendency to invade nerves and perineural lymphatics facial nerve involvement was high (30%), because of which it has poor prognosis. In our study, the incidence of adenoid cystic Ca was 3% which co-relate with the previous studies.

SUBMANDIBULAR GLAND TUMOURS

Type	Conley et al., 1972	Spiro Et al., 1975	Pinkston & Cole 1999	Vargas PA et al 2002	Present Study 2006-09
Benign	53%	44%	78%	80%	100%
Malignant	47%	56%	22%	20%	-

Of the 34 salivary gland tumours, 5 cases were diagnosed as submandibular tumours, of which all were benign mixed tumour.

In the previous studies 5% of tumours were seen in submandibular gland of which 50% are malignant. In our study 14% of tumours occurred in submandibular glands of which all

are benign tumours. FNAC was done in all the 5 cases, of which all showed benign mixed tumour.

POST OPERATIVE COMPLICATION

The most feared complication after parotidectomy is facial nerve paralysis, which is reported to be 3 – 5% permanently and transient facial nerve palsy is reported to be 8.2 to 65%. (Mehle et al., 1993.)

	Facial N Palsy %
Dallera et al 1993	1.4
MRA et al 1993	2.1
Witt 2002	18
Present study 2006-09	8.8

In our study, permanent facial palsy is seen 1 case (4%) and transient facial palsy in 5 cases (20%).

This is mainly because identification of the facial nerve was carried out by identifying mastoid process initially as its spatial relation to the nerve trunk is constant. So in the firth step of

superficial parotidectomy the trunk is identified first the plane of dissection maintained immediately on the anterior surface of the mastoid process as no vital structure lies between the fingerstip and the stem of the seventh nerve.

Many techniques have been proposed over the years for accomplishing parotidectomy with identification and preservation of the facial nerve and its five or more major branches. Full knowledge of the anatomy is essential for safe surgery on this gland (Beahrs 1977).

CONCLUSION

In this study age, sex incidence, histopathological type, and various treatment modalities of parotid and submandibular gland tumour were analysed in particular reference to Fine Needle Aspiration Cytology and surgical treatment.

The parotid gland tumours are common on 3rd – 6th decade and submandibular gland tumours are noticed in 2nd and 3rd decade.

The incidence of benign mixed tumours of parotid is equal in both the sexes. Warthin's tumour was noticed only in male patient. The incidence of malignant tumour is common in male patients.

Fine Needle Aspiration Cytology (FNAC) of the parotid gland was positive in all malignant cases. In benign tumours it was positive in 80% of cases. In rest of the cases it was inconclusive.

In submandibular gland tumours it was positive in all benign tumours.

No complication was encountered following FNAC. So it has go a definitive role in pre-operative diagnosis of all malignant tumours of parotid gland and submandibular gland tumours. This simple and effective procedure with high specificity and sensitivity can be recommended in all salivary gland tumours.

In tumours of the parotid gland, post-operative facial nerve palsy was rarely noticed.

The best means of reducing iatrogenic facial nerve injury in parotid surgery remains a keen understanding of the anatomy coupled with a gentle technique.

MASTER CHART

S. No.	Name	Age/Sex	IP No.	FNAC/ Results	Pathology	Managemer
1.	Kamrunisha	58 F	041675	FNAC +ve	Mixed Parotid Tumour	Superficial Parotidecton
2.	Mahalakshmi	36 F	036876	FNAC +ve	Mixed Parotid Tumour	Superficial Parotidecton
3.	Basha	24 M	016864	FNAC +ve	Monomorphicadenoma	Superficial Parotidecton
4.	Arunachalam	43 M	042868	FNAC not done	Mixed Parotid Tumour	Superficial Parotidecton
5.	Krishnamurthy	38 M	040890	FNAC not done	Mixed Parotid Tumour	Superficial Parotidecton
6.	Arul	41 M	036214	FNAC +ve	Adeno Lymphoma	Superficial Parotidecton
7.	Ramarajan	24 M	041631	FNAC not done	Mixed Parotid Tumour	Superficial Parotidecton
8.	Raja	29 M	044618	FNAC –ve	Mixed Parotid Tumour	Superficial Parotidecton
9.	Shankar	19 M	036030	FNAC +ve	Mixed Parotid Tumour	Superficial Parotidecton
10.	Lakshmi	34 F	032312	FNAC not done	Mixed Parotid Tumour	Superficial Parotidecton
11.	Kaliammal	66 F	031670	FNAC +ve	Mixed Parotid Tumour	Superficial Parotidecton
12.	Rani	25 F	023667	FNAC +ve	Mixed Parotid Tumour	Superficial Parotidecton
13.	Balaji	24 M	026874	FNAC not done	Mixed Parotid Tumour	Superficial Parotidecton
14.	Maheswari	24 F	036817	FNAC +ve	Mixed Parotid Tumour	Superficial Parotidecton
15.	Rajadurai	43 M	016817	FNAC -ve	Mixed Parotid Tumour	Superficial Parotidecton
16.	Rajammal	68 F	026184	FNAC not done	Mixed Parotid Tumour	Superficial Parotidecton
17.	Arasamma	63 F	036572	FNAC not done	Mixed Parotid Tumour	Superficial Parotidecton
18.	Siva	21 F	036849	FNAC +ve	Mixed Parotid Tumour	Superficial Parotidecton
19.	Anandhi	29 F	038607	FNAC +ve	Mixed Parotid Tumour	Superficial Parotidecton
20.	Rajathi	38 F	021476	FNAC not done	Mixed Parotid Tumour	Superficial Parotidecton
21.	Sakthi	17 M	026712	FNAC not done	Mixed Parotid Tumour	Superficial Parotidecton

22.	Karpagam	39 F	016781	FNAC -ve	Mixed Parotid Tumour	Superficial Parotidecton
23.	Suguna	48 F	061721	FNAC +ve	Mixed Parotid Tumour	Superficial Parotidecton
24.	Kumaresan	17 M	012161	FNAC +ve	Mixed Parotid Tumour	Superficial Parotidecton
25.	Najeema	49 F	031612	FNAC +ve	Mucoepidermodia Ca	-
26.	Varadan	34 M	04858	FNAC +ve	Mucoepidermodia Ca	Total Parotidecton
27.	Meenakshi	46 F	016178	FNAC +ve	Adenoid Cystic Ca	Total Parotidecton
28.	Rajasekar	50 M	041262	FNAC +ve	Muco epidermodi Ca	Total Parotidecton
29.	Kannan	44 M	041265	FNAC +ve	Muco epidermodi Ca	-
30.	Rajaraman	18 M	036812	FNAC +ve	Benign Mixed Tumour	Excision
31.	Manivelan	20 M	061362	FNAC +ve	Benign Mixed Tumour	Excision
32.	Susheela	26 F	036316	FNAC +ve	Benign Mixed Tumour	Excision
33.	Mahesh	30 M	026431	FNAC +ve	Benign Mixed Tumour	Excision
34.	Rukmani	16 F	013125	FNAC +ve	Benign Mixed Tumour	Excision

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PROFORMA

Name : Age/Sex : IP. No.

DOA : DOO : DOD :

History

Clinical Features Investigations :

FNAC

Diagnosis

Procedure Done ;

Post OP Complications

Recognition of Facial Nerve Palsy

Management of Facial Nerve Palsy

Follow up

SALIVARY GLAND TUMOUR INCIDENCE
PRESENT STUDY 2006-09